

CLAIMS

What is claimed is:

1. A mobile wireless transmit/receive unit (WTRU) configured for wireless communication with a network system having a plurality of base stations where the WTRU receives communication data that is selectively encoded and transmitted in predefined time frames, comprising:

a joint detector receiver configured to receive and process multiple wireless signals in each of a series of time frames, each signal received within a common timeslot having a unique channel encoding of the same communication data, including:

a plurality of channel estimators, each configured to produce a channel estimate of a respective received signal within a common timeslot based on the unique encoding of the received signal;

a combiner configured to receive channel estimates from all of the channel estimators and combine the channel estimates for each data signal received in a common timeslot into a combined data signal, whereby the communication data common to the plurality of signals received in the common timeslot is then derived from the combined signal.

2. The invention of claim 1 further comprising a blind code detection unit for limiting the spreading codes for neighboring WTRUs to only those comparable to or stronger than the WTRU's own codes.

3. The system of claim 2 wherein the communication signals are of a time-division duplex-code division multiple access (TDD-CDMA) type.

4. A wireless communication system comprising:
  - a network unit;
  - a plurality of base stations interconnected with the network unit, each base station having a geographic area of service;
  - a mobile wireless transmit/receive unit (WTRU) configured for wireless communication with the base stations where the WTRU receives communication data that is selectively encoded and transmitted in predefined timeframes from the base stations;
  - the WTRU having a joint detector receiver configured to receive and process one or more communication data-carrying wireless signals in each of a series of timeframes where each signal received within a common timeslot has a unique channel encoding of the same communication data, including:
    - a plurality of channel estimators, each configured to produce a channel estimate of a respective received signal within a common timeslot based on the unique encoding of the received signal;
    - a combiner configured to receive channel estimates from all of the channel estimators and combine the channel estimates for each data signal received in a common timeslot into a combined data signal whereby the communication data common to a plurality of signals received in the common timeslot is then derived from the combined signal; and
  - the network unit configured to assign selected base stations to transmit communication data to the WTRU based on the WTRU being disposed in the geographic range of service of the selected base stations.

5. The system of claim 4 wherein the communication signals are of a time-division duplex-code division multiple access (TDD-CDMA) type.

6. The system of claim 4 wherein the WTRU communicates on uplink and downlink channels jointly with first and second base stations, the uplink and

downlink channels each carrying data communications containing a midamble code sequence MA<sub>i</sub>, spreading code C<sub>i</sub>, and scrambling code S<sub>i</sub> uniquely assigned by the network to a respective base station and WTRU pair to distinguish from neighboring WTRUs and base stations; and convolutional or turbo coding for error reduction, wherein a first channel estimator is configured to produce a first channel estimate of the downlink channel from the first base station responsive to a first midamble MA<sub>1</sub>; a second channel estimator is configured to produce a second channel estimate of the downlink channel from the second base station responsive to a second midamble MA<sub>2</sub>; the combiner further comprising:

a data estimator configured to receive the channel estimates; jointly detect data received from the first and second base stations, using a first spreading code and first scrambling code with respect to the first base station and using a second spreading code and the first scrambling code with respect to the second base station; and output a soft combined data signal; and

a decoder configured to decode the convolutional or turbo coding of the soft combined data signal to produce a reconstructed data signal transmitted by the first and second base stations.

7. The system of claim 6 wherein the second base station communicates with a plurality of WTRUs and at least one mobile WTRU in soft handover, the second base station comprising:

a joint detection receiver including:

a plurality of channel estimators configured to process individual uplink signals from each WTRU with the midamble codes;

a data estimator for processing the channel estimates with a plurality of scrambling codes and spreading codes associated with the WTRUs in uplink communication with the second base station; and

a decoder to decode the convolutional or turbo coding of data estimator output signals to produce reconstructed data signals transmitted in the uplink communications.

8. The system of claim 7 wherein the separate scrambling codes are a third scrambling code associated with the WTRU in soft handover and a fourth scrambling code associated with neighboring WTRUs in uplink communication with the second base station.

9. A method of wireless communication for a mobile wireless transmit/receive unit (WTRU) configured for wireless communication with a network system having a plurality of base stations, each base station having a geographic area of service, where the WTRU receives communication data that is selectively encoded and transmitted in predefined timeframes, the method comprising:

locating the WTRU within the geographic areas of service of multiple base stations;

receiving wireless signals from each of a plurality of base stations in each of a series of timeframes where each signal received within a common time slot has a unique channel encoding of the same communication data;

producing a channel estimate of each respective signal received within a common timeframe based on the unique encoding of the received signal;

combining the channel estimates for each data signal received in a common time slot to produce a combined data signal for each respective timeframe; and

deriving the communication data common to the plurality of signals received in each common timeslot from the combined signal for each respective timeframe.

10. In a wireless communication network comprising a mobile wireless transmit/receive unit (WTRU) performing data communication with a first base

station and within communication range of a second through Nth base station, a method for soft handover, comprising the steps:

the WTRU measuring received signal code power (RSCP) measurements from each base station;

the network assigning the WTRU to a new base station responsive to received measurements from the WTRU;

the new base station and the first base station simultaneously transmitting the same network data in a common timeslot to the WTRU;

the new base station and the first base station simultaneously receiving and demodulating data from the WTRU for processing by the network; and

the WTRU jointly detecting the communications from the first base station and the new base station using separate channel estimate means based on the known scrambling and spreading codes for each base station, until soft handover to the new base station is complete.

11. The method of claim 10, wherein the base station broadcasts on a beacon channel and transmits data on a dedicated channel, further comprising the steps:

the WTRU sending an uplink transmit power control (TPC) command signal to both the first base station and the new base station;

the network adjusting target SIR signals for the first base station and the new base station for ensuring that at least one base station will receive an error-free message; and

the WTRU receiving a first target SIR for the first base station and a second target SIR for the new base station.

12. The method of claim 11 further comprising the steps:

the WTRU cycling through each base station, periodically measuring beacon channel power and reading data;

the network arranging all broadcast time slots to be coincident for ensuring that there is no conflict between receiving broadcast signals of the beacon channel and data of the dedicated channel from each base station.

13. The method of claim 10, wherein the new base station performs softer handover of the WTRU from a first sector of its communication range to a second sector of its communication range, the method further comprising the steps:

the WTRU measuring received signal code power (RSCP) measurements from each base station sector;

the network assigning the WTRU to the second base station sector responsive to received measurements from the WTRU;

the second base station sector and the first base station sector simultaneously transmitting the same network data in a common timeslot to the WTRU;

the base station jointly detecting uplink communications from the WTRU received by the first and second base station sectors, soft combining and demodulating data from the WTRU for processing by the network; and

the WTRU jointly detecting the communications from the first base station sector and the second base station sector using separate channel estimate means based on the known scrambling and spreading codes for each base station sector, until softer handover to the new base station sector is complete.

14. The method of claim 13, wherein the base station broadcasts on a beacon channel and transmits data on a dedicated channel, further comprising the steps:

the WTRU sending an uplink transmit power control (TPC) command signal based on measured SIR;

the base station receiving parallel TPC command signals at the first and the second base station sectors, soft-combining and decoding the parallel TPC commands to produce a resultant TPC command for the network;

the WTRU receiving a target SIR adjusted and produced by the network for controlling transmit power of the WTRU, the target SIR being sent to the WTRU in parallel from both the first and the second base station sectors; and

the WTRU adjusting its transmit power to the lowest power necessary to achieve the target SIR.

15. The method of claim 14 further comprising the steps:

the WTRU cycling through each base station sector, periodically measuring beacon channel power and reading data;

the network arranging all broadcast time slots to be coincident for ensuring that there is no conflict between receiving broadcast signals of the beacon channel and data of the dedicated channel from each base station sector.